

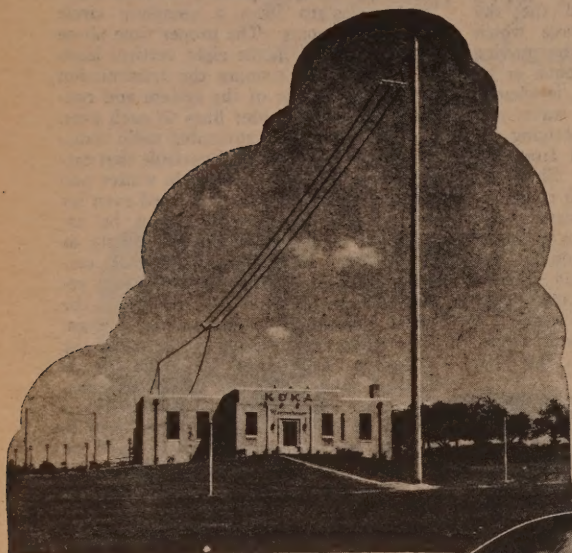
THE HORN SPEAKER

THE NEWSPAPER FOR
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ELECTRONICS AND SOUND

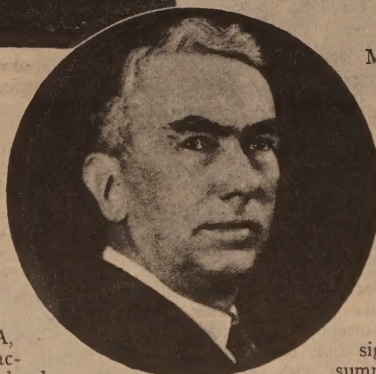
By Albert Pfaltz

RADIO NEWS FOR APRIL, 1931

KDKA



Above is an outside view of the new KDKA transmitters at Saxonburg, Pa. Dr. Frank Conrad—at right—a pioneer broadcaster and assistant chief engineer of the Westinghouse company, who has just been awarded the Edison medal for his contribution to radio broadcasting and short-wave radio transmission



IN the amazing manner of what may some day be known as the "radio decade," our erstwhile pioneer and infant commercial broadcaster, KDKA, has achieved the ripe old age of ten and acquired a 500 horsepower voice. It seems hard to realize that 400,000 watts of power have grown from the feeble, hesitant, 100-watt transmitter that undertook the task of sending news to a few eager listeners on that momentous evening of the Harding presidential election. Since that occasion, November 2, 1920, the station has not missed a single day of broadcasting.

Those gifted with an historic mind or a penchant for first causes may perhaps rejoice that the late war had something to do with the fact that we now listen to Phil Cook, Amos 'n' Andy, or the Philharmonic Symphony. It had—and for the simple reason that the Westinghouse Electric and Manufacturing Company did considerable work in radio during the World War, first for Great Britain and later for the United States. At the end of the conflict, H. P. Davis, vice president, who had been directing war activities of the company, found a large staff of men and considerable equipment on hand. Mr. Davis decided to make use of this personnel and equipment.

Experimental stations 2WE and 2WM were set up, one at the East Pittsburgh plant and the other at the Wilkesburg home of Dr. Frank Conrad, Asst. Chief Engineer of the Company. Step followed step until it became possible for Dr. Conrad to broadcast entertainment programs from his home each Saturday night. These became so popular with the radio amateurs that one of the Pittsburgh department stores advertised receiving sets that would bring in the Conrad programs.

Seeing this advertisement convinced Mr. Davis that the proper field of radio was unlimited, that it could be a medium of mass communication as well as a means of secret and confidential messages. So plans were made to broadcast regular programs from the Westinghouse plant, instead of from the Conrad home, and to begin this service with the returns of the national election, November 2, 1920.

The company's first broadcasting was from a rough "box" affair on the roof of one of the taller buildings of the plant.

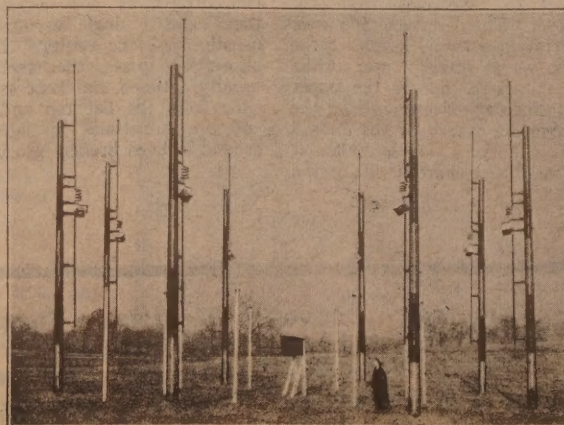
At the right is shown the short-wave antenna system at the Saxonburg site. Through station W8XK programs are regularly sent to listeners in foreign countries

Much of the interesting history of the development of broadcast and entertainment technique by station KDKA is now well known. Thousands of radio listeners, of course, remember that the early program material was drawn largely from phonograph records. They also remember that the KDKA Little Symphony Orchestra was an outstanding feature in those early years of broadcasting. Some may not know that in order to accomplish good sound reproduction it was realized that rooms for that purpose would have to be specially designed and that in the case of the first of the summer broadcasts, it was decided to erect a tent which was used for some months as a broadcast studio. Everything went along satisfactorily during the summer and early fall until one night a high wind blew the tent away. And so the first studio of KDKA passed out and into history. The studio was then moved indoors and the tent "pitched" on the top floor of one of the buildings.

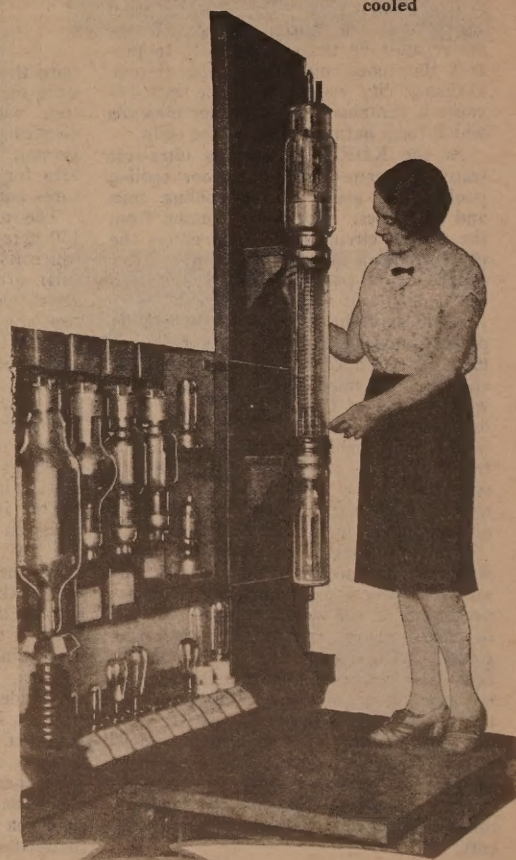
Shortly after that the subject of a specially-constructed studio was again revived and designs were prepared. The elements of the present-day studio in which the ceilings, floors and walls are built of materials, sound absorbing in character, are to be found in the early efforts of KDKA.

Church services, sport events, public addresses, concerts, opera, conventions and scores of other broadcasts followed as new pick-up stations were established, and the wave of popularity that greeted radio during 1921 was greater than anything known in the industrial and commercial world.

In brief, within the last decade radio has progressed from



AW-220 tube is 72 inches in height, has a diameter of 8 inches and weighs 60 pounds. It has a capacity of 200 kilowatts and is water-cooled



At the left is the power stage equipment of the Saxonburg transmitter and from this panel energy goes directly to the huge spray type antenna designed by Dr. Frank Conrad. Two of the new tubes are shown set up in their tube trucks. The large plates at the right and the coil at the top handle the enormous radio frequency energy generated at this point. They compose the tank condenser of this transmitter and are made of aluminum

programs of records to recorded programs, from studio niches, wherein a potted palm tree rubbed elbows with a grand piano, to the "cathedral" studio at N. B. C., from entertainment of sorts to some sort of advertising with good entertainment, from strictly local broadcasting to Little America and return. More than this. Television is no longer lurking around the corner. One might almost say it is larking around the corner. The Radio City in New York is soon to become an actuality. The first step will involve the razing of three whole midtown city blocks. Such is progress.

One of the most important innovations is the new tube with a capacity of 200 kilowatts. This tube is not merely an enlarged edition of a smaller tube, but is thoroughly engineered as a tube of larger size and of a distinctly novel design. The mere building of a larger tube following the style of the smaller type would not produce the results desired. The quality of output and the life of such a tube would not be up to the desired standard.

The new tube, called the AW-220, is 72 inches in height, has a diameter of eight inches and weighs 60 pounds. Two of the new tubes are incorporated in the transmitter.

In its design engineers found one of their greatest problems to be that of cooling the grid. This difficulty has been solved by I. E. Mourmontseff, company research engineer, who has produced a water cooled tube of great mechanical strength and sturdiness embodying a double end construction.

A modern water softening system has been installed for use in connection with the cooling system for these gigantic vacuum tubes. There is a practical reason for this installation because these giant tubes are expensive and unless properly protected their useful life period is limited. Therefore, anything that can be done to increase their life constitutes a saving in costly replacements.

According to E. B. Landon, chief operator of the transmitting station, the water must be tested frequently to protect the tubes and the cooling system. Ordinary city water cannot be used because it contains lime and other minerals which form harmful scale in the coils.

At the KDKA station this ultra-soft water is pumped to an outdoor cooling pool before going to the cooling coils and the tubes. Hot water coming from the station circulatory system enters the pool through a fountain-like spray. After cooling in the pool, it is pumped through the same circuit again.

An idea of the capacity of the cooling problem may be obtained from the statement that approximately five tons of cooling water must be passed through the water jacket of the tube each hour it is in operation. This water cools the tube in the same manner as water in an automobile cools the motor. One hour's operation of the tube would heat enough water to supply the domestic requirements of the average home for several weeks.

While of course these AW-200 tubes will only be used to generate high frequency power for radio stations, an appreciation of the power capacity of one of these tubes can perhaps best be gained by a comparison with familiar household devices. For example, a similar amount of power of the kind distributed commercially would operate simultaneously four hundred toasters or flat irons. This would also be the equivalent of power required to light one thousand average homes of five to six rooms or the energy to operate two modern street cars.

The antenna system of the new KDKA radio transmitting station, conceived by Dr. Conrad, is designed to make the local signal strength less than it would be for the conventional type of antenna, and to make the distant signal strength greater than for the conventional antenna. This is desirable from the standpoint of both listener and broadcaster; it makes the signal less objectionably loud to local listeners, and yet gives better reception to distant listeners; and it allows the broadcaster to use the radiated energy to better advantage in reaching distant points, since less energy is absorbed by objects in the local area.

The Antenna System

Sixty-two rigid tests were made to find a location which would be adaptable to favorable broadcasting before Saxon-

KDKA's famous symphony orchestra, which is nationally known for its regular broadcasts



burg was definitely selected. These tests were made to determine the proper altitude with no interference from metal construction, free from trees so as to prevent undue interference and ample area for erection of the necessary structures and antennas.

The site at the new transmitter occupies 130 acres. The long-wave antenna over which KDKA broadcasts consists of a circular arrangement of poles surrounding about eight acres. The poles are 100 feet above the ground and painted, according to law, yellow and black. Aerial hazard beacons also have been erected to serve as a warning to aviators.

A much smaller space is required for the short-wave transmitter of W8XK. It is through the short-wave station that programs are sent great distances for reception in far away lands.

The functioning of this antenna is based on the fact that local reception is due to radiation horizontally outward from the antenna that is, the ground wave; whereas distant reception depends considerably on radiation initially at an angle of elevation, due to the wave front descending as it moves outward from the antenna, and to reflections from the Heaviside layer. The descent of the wave front as it travels outward is due to the fact that the waves travel slower at the surfaces of the earth than in the upper atmosphere; and the reflections from the Heaviside layer are caused by the ionized condition of the layer which makes it conducting, i.e., like a short-circuit on the

end of a transmission line, except that the lines of force are not guided by wires, and hence follow the ordinary law of equal angle of incidence and reflection. There is really no line of demarcation between the ground wave and the upward radiation, conveniently called the sky wave. The part of the wave which reaches the receiving antenna by moving out horizontally from the antenna or by the descent of the wave front, is what is usually meant by the ground wave, and the part which reaches the receiving antenna by reflection downward from the ionized layer, the sky wave. Since the ground wave is attenuated with comparative rapidity, the distant signals are carried largely by the sky wave, and if the ratio of horizontal radiation to sky-wave radiation can be decreased, the desired ratio of local or distant signal strength should be attained.

This decreased ratio of ground to sky-wave radiation is obtained in the new

tions. In contrast to this the new KDKA antenna has eight wood poles about 100 feet high, spaced on a circuit more than 700 feet in diameter and having a vertical down lead at each of the poles, the cage top being suspended between adjacent poles to form a complete circle around the poles. The proper time phase of the currents in the eight vertical leads is obtained by running the transmission line to the center of the system and running individual feeder lines to each pole.

Since the factors governing radio transmission are so many and variable that satisfactory formulas, applicable winter and summer, have not been developed even for the simplest antenna, it cannot be expected that reception will be exactly as calculated. It is possible that in certain localities absorption and minor reflections will entirely over-balance the effect produced by the antenna design. Also while transmission by means of the sky-wave works well at night, it is usually not satisfactory in the daytime. Therefore, for daytime transmission it would be preferable to get the opposite of the effect described above, and to broadcast to a more limited area by means of the ground wave. The opposite effect, suppression of sky-wave and reinforcement of ground wave, can be produced by making currents in opposite poles at 180° out of phase, so that adjacent poles are 45° out of phase. The difference in phase can be obtained by making the feeder lines of different lengths or by artificial lines. Thus, when conditions are not favorable for transmission by reflections of the sky-wave, it is possible to change over by simply changing the feeder line connections, to an antenna arrangement suitable for ground-wave transmission.

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From Circuit Design to Freight Car

RADIO NEWS FOR FEBRUARY, 1981

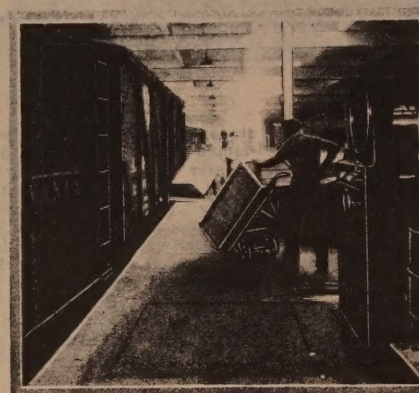
A pictorial trip through the factory of Silver-Marshall, Inc. showing the huge stock rooms, coil winding department, design laboratory and production test positions.



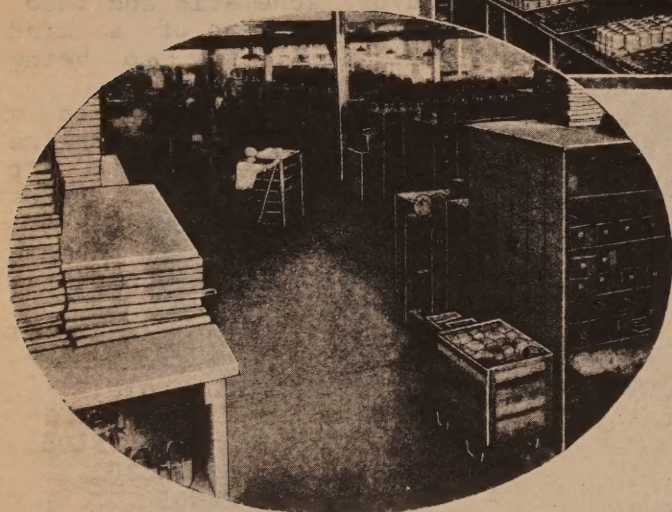
McMurdo Silver, founder and president of Silver-Marshall, Inc., one of the largest manufacturers of radio parts and custom-built superheterodynes in the world

(Right)

The standard-gauge railway terminal in the Silver-Marshall factory, where raw material is unloaded. Freight cars are reloaded with outgoing merchandise before they leave the plant



Above, the coil winding department where the enormous number of coils are made that are required daily in the construction of Silver-Marshall Superheterodyne receivers. At the left is the 12,000-foot, centrally located stock room into which all material flows and from which it is drawn as needed by the various departments. All preliminary inspections of raw materials are also made here which greatly speeds up operations in manufacturing departments

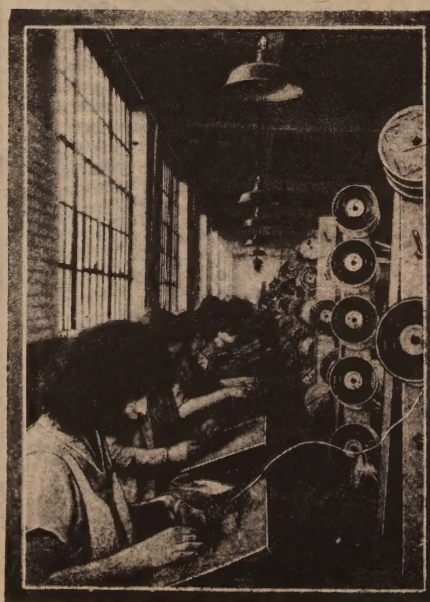
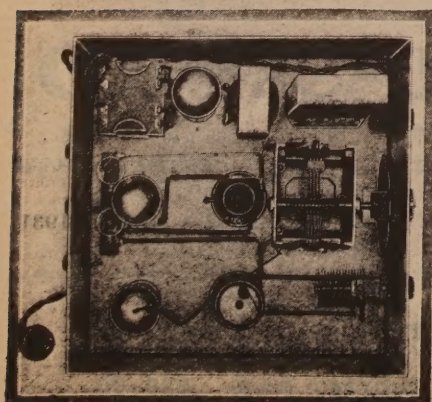


(Right)

Because of the precision methods of manufacture required in the making of superheterodynes, all wiring in Silver-Marshall receivers is pre-formed and laced into cables by forty girls in this Cable Forming Department

(Left)

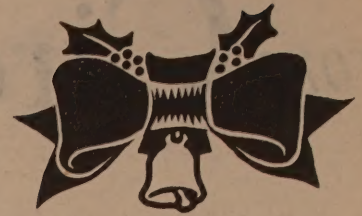
Top view of an S.M. 738 Short-Wave Converter, showing the exactness with which assembly is carried out at the Silver-Marshall factory



(Left)

Detailed view of one of the six testing booths at the Silver-Marshall factory. These booths are arranged strategically along the production line, the receiver chassis entering through a window, shown at the left

William J. Frisbie, for four years
Factory Superintendent with Silver-
Marshall, Inc. The present plant was
laid out to his specifications



Mailbox

Dear Jim -

Glad to see my letter on the Edison battery oil in print. (The paper quality is great as is.) Recently found a bottle of the Edison battery oil FULL, with a cap like used on beer or sodas, in Vermont while on vacation. Oil looks heavy, but perhaps is condensed.

Can anyone in H. S. land tell me anything about my recently acquired "GLOBE NAVIGATOR RADIO"? It's a 12" globe pivoted on 2 posts on a wooden base which also mounts the pilot lite and on-off volume control. A cable connects to the five tube AC-DC radio in the globe which uses 12A8, 12K7, 12Q7, 35L6 and 35Z5. Rotating the globe tunes the stations. Can't find manufacturer and/or schematic and info. Model is TSG 4A. One of a kind and well on its way to being completely restored.

My pride and joy is a Sparton Bluebird Blue Vaseline glass mirrored radio. Very art deco with 3 chrome strips across the 15" diameter mirror. Dial in center with chrome knobs and speaker behind dial. Model is 566. Any others out there? What value should I place on it for insurance purposes? Thanks for any help.

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Above, part of the research laboratory at the factory, where the all-famous S-M. circuits are developed. From here they go downstairs to the factory laboratory, where working models are designed. From the production lines, which are pictured at the right, the completed receivers go over a conveyor system through the test booths, where the tuning condensers are aligned and the receivers are tested for sensitivity

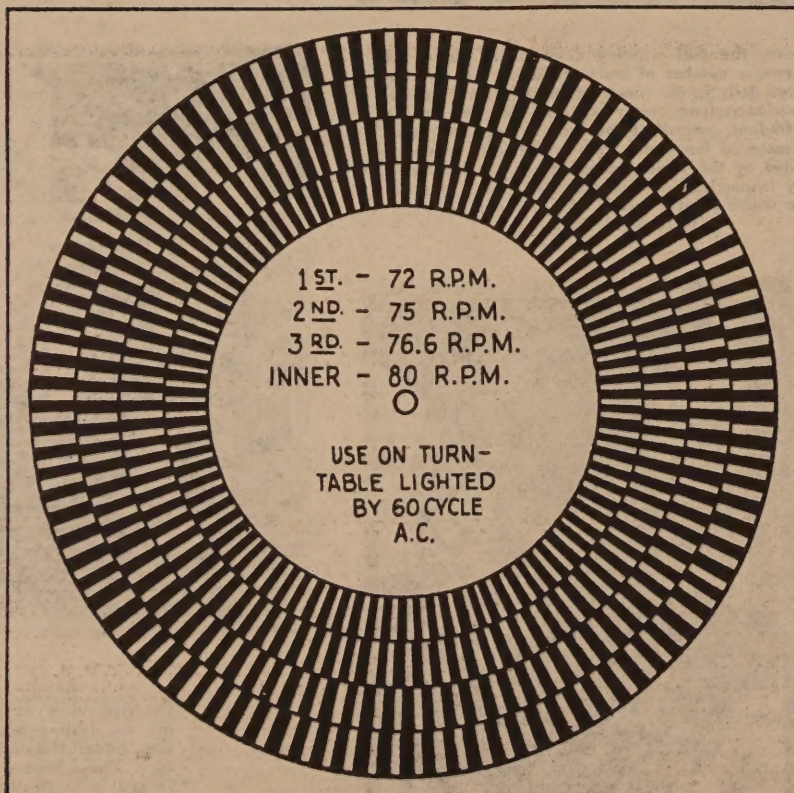
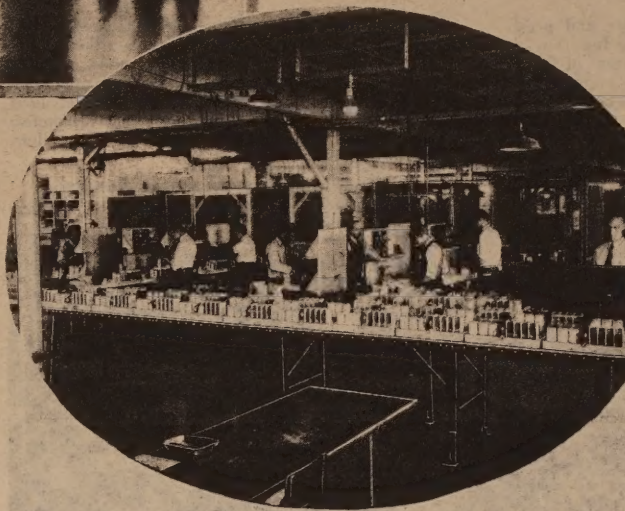


Fig. 2

A quadruple stroboscope suitable for home recording. If the speed of the turntable is, for instance, 76.6 R.P.M., then the two outer scales will seem to rotate in one direction and the inner scale in the other.

Five Minutes of Radio for a Nickel

Radio News for April, 1926

By JOSEPH RILEY

ONE of the favorite pastimes of the American people is dropping coins in a slot. There are the familiar weighing machines in every railroad station, which for the sum of one cent will indicate your correct weight. There are machines scattered all over the country that dispense chewing gum, candy and other eatables for the same amount. If your boots need shining, there is no need to wait for the shoe-shine artist; go to the nearest shine machine and place your shoes in its care.

Not to be behind the trend of the times, the radio slot machine has made its appearance. If you forget to bring your pocket portable receiver with you, and there is a program on the air that you are particularly anxious to hear, just walk into a store that has one of these radio receiver slot machines, drop a nickel in the slot, set the two dials of the set—and your station will be heard from the loud speaker in the top of the machine.

HOW IT OPERATES

This slot machine made its appearance recently in Philadelphia and consists of a five-tube radio frequency receiver, having one stage tuned R.F., one stage of fixed R.F., detector and two stages of audio frequency amplification. There is also a timing mechanism which limits the reception to five minutes. On the side of the machine next to the slot in which the nickels are deposited, is a table showing the times when stations are broadcasting and also the necessary dial settings of the receiver.

The small knob below the slot is turned after the nickel is deposited. This starts the motor which operates the timing mechanism. After four minutes of music a red electric lamp lights in the front of the cabinet, warning the listener that if he wishes to continue the reception beyond the period of another minute another nickel must be dropped in the slot. This must be repeated every five minutes. The opening of the loud speaker horn is behind the grill work above the dials of the receiver, and the timing mechanism is under it.

Before long, it is possible these machines

will be as common a sight as the many different types of vending machines that are familiar to everybody today and then the

American boy and girl will have another slogan, "Papa, gimme a nickel I wanta hear some radio music!"



When a nickel is dropped in the slot, your favorite radio station can be tuned-in by the two dials on the front of the cabinet.

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Ads

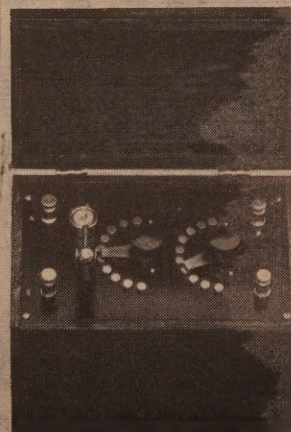
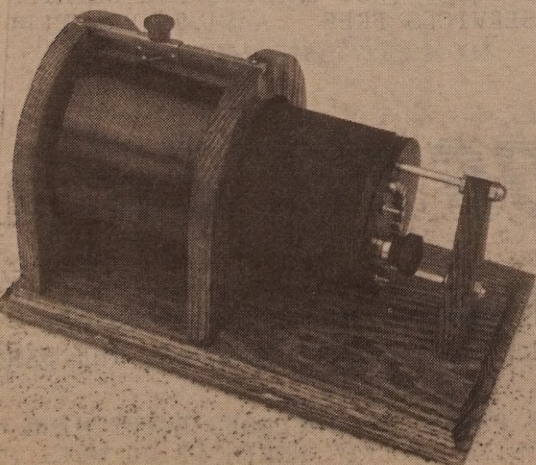
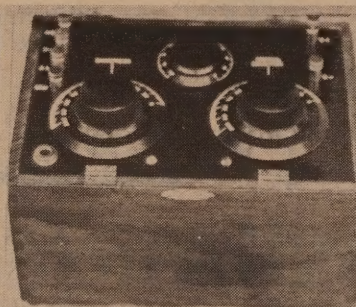
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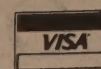
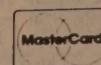
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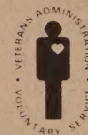


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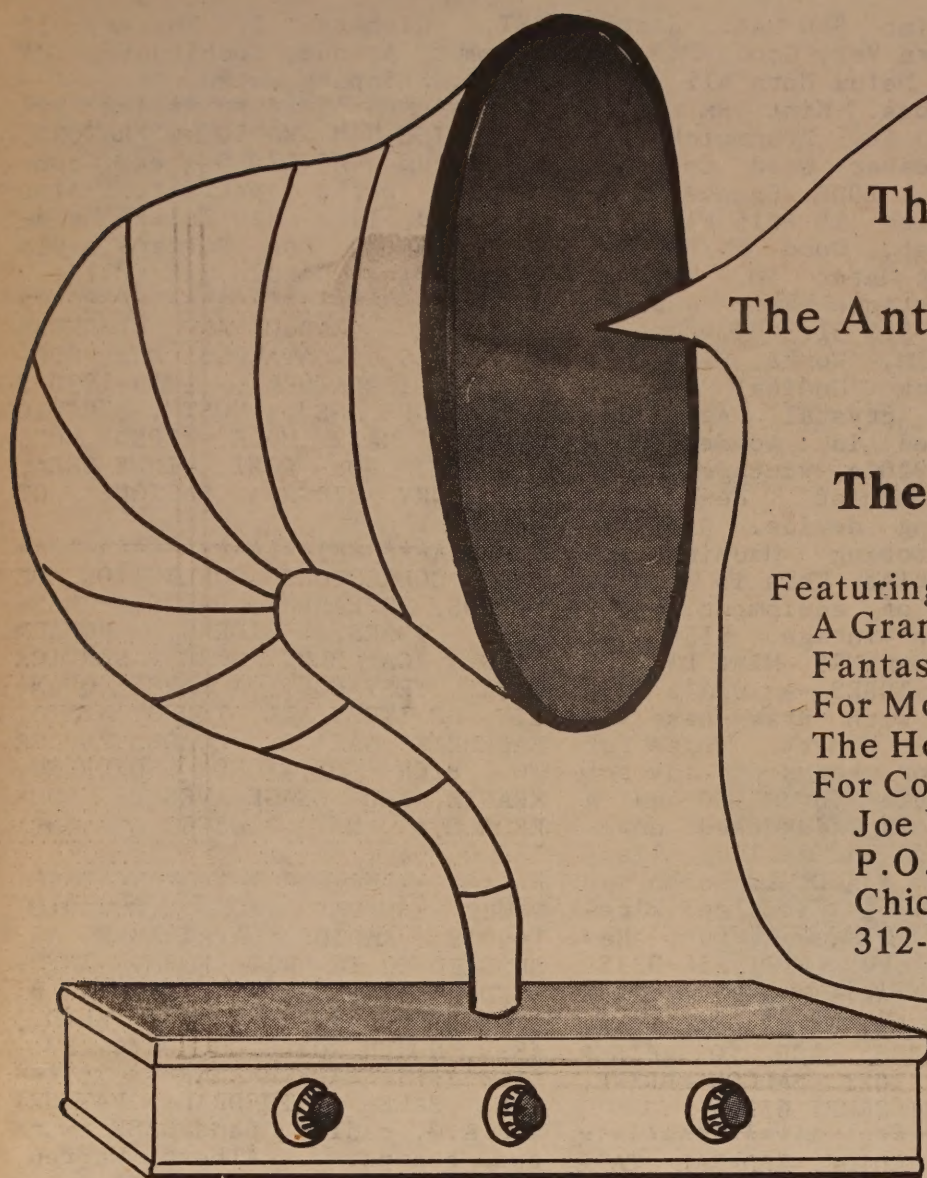
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 22. CROSLEY TRIDYN REGULAR; mint condition, with tubes \$85.00 -- 23. RADIOLA IIIA; mint condition, no tubes \$120.00 -- 24. RADIOLA 20; excellent condition, with tubes, plays \$125.00 -- 25. AMBASADOR; early 3 tube regenerative, marble colored panel, excellent, \$45.00 -- 26. CROSLEY XJ; excellent condition, no tubes \$90.00 -- 27. ATWATER KENT 33; very good, no tubes, \$55.00 -- 28. MICHIGAN NRC-1; 1 tube regenerative, mint condition, \$250.00 ***** SPEAKERS, all work ::::: 29. PEERLESS; excellent \$30.00 -- 30. RCA GLOBE 100; excellent \$25.00 -- 31. CROSLEY F; excellent \$28.00 -- 32. TEMPLE; excellent \$25.00 -- 33. RCA UZ-1325; horn, excellent \$75.00 -- 34. ATLAS horn; excellent \$75.00 -- 35. MUZETTE horn; excellent \$70.00 ===== List changes daily. Phone (412) 656-0338. Or write: Jerry Finamore, 501 Miller Avenue, New Castle, Pennsylvania 16101 *****
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model 35 \$100, Philco Jr., works, cabinet scratched up \$45, Philco 39-70 \$45, Nazi Volksempfänger, crack on side \$100, Croyden - Australian radio \$60, shipping extra on above. Super Zenith model VIII \$100 - will deliver in Southwest. Various radio fan magazines from 1930s and 40s, \$10 each. 2 original Abbott and Costello radio scripts, 1 Fred Allen \$35 each H. Pike, 314 Enrico, Sierra Vista, AZ 85635

FOR SALE AK'S 21, 49, 559 RADIOLA'S 24, 28. OTHER SETS, PARTS, TUBES. 1920 Z-NITH (CHICAGO RADIO LABS) FOR TRADE. RAYMOND THOMPSON, 7422 CHERRY TREE DRIVE, FULTON, MARYLAND 20759

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--- Fireside has recently acquired a private collection. The condition of most of these sets is almost unbelievable. Some of the sets look as though

they have never been sold, but stashed away since the 1920's. Therefore, pay special attention to the condition listing of each piece: MINT- Chassis like brand new. Cabinet probably the same (a few cabinets may have a few scratches or something, but nothing couldn't be made perfect very easily). EXCELLENT- Probably would have called these mint or near mint if the other pieces were not so perfect. VERY GOOD- Very nice piece. Easily restored or made excellent. GOOD- Average condition. Restorable without too problem. FAIR- Needs some work, but nothing is missing. *Prices do not include shipping. LT- means less tubes, WT- means with tubes. Make money order or cashiers check to Gary Hill. *Items over \$100 are satisfaction guaranteed for 10 days. If not satisfied return within 10 days for full refund minus all shipping charges. *Calling to reserve sets ahead of time

is encouraged: Fireside Wireless, 1507 Ridge Avenue, New Castle, PA 16101 (412) 654-9335
----- 1. Paragon RD5 Mint LT/\$300 WT/\$340 -- 2. RB5 Exc. LT/\$200 WT/\$240 -- 3. Crosley Trirdyn 3R3 3 tube set. Exc to Mint LT/\$100 WT/\$115 -- 4. Freshman Masterpiece Exc. LT/\$75 WT/\$100 5. AK 20 (Big box) Chassis and cabinet Mint (Front panel has some scratches but still nice) LT/\$95 WT/\$120 6. Paige 6 6 tube set. Mint LT/\$85 WT/\$115 7. Crosley RFL 60 Mint 5 tube set with fancy decorated panel. LT/\$90 WT/\$115 8. Freed Eismann FE 15 5 tube set. Mint LT/\$125 WT/\$150 9. Freed Eismann NR7 6 tube set. Exc. LT/\$95 WT/\$125 10. Freed Eismann NR-45 Large set with door on front. Exc. LT/\$125 WT/\$150 11. Radiola 26 Mint LT/\$200 WT/\$250 12. A.C. Dayton XL5 5 tube set. Mint LT/\$125 WT/\$150 13. Silvertone Neutrodyne 5 tube set. Mint (Even has instruction book.) LT/\$95

WT\$120 14. Clarion 5 tube set. Mint LT/\$85 WT\$110 15. Radiola 20 Exc. LT/\$115 16. Crystal Set Very nice. Probably home made. Don't know much about this piece. Comes with head phones, crystals and detector mounted in wooden box with other components (coils). Looks very early. Exc. \$75 17. Signal 5 tube set. Exc. to Mint. LT/\$65 WT/\$90 18. Grebe CR5 1 tube set. Mint. \$300 19. Majestic Treasure Chest. Cute AC novelty set. Cabinet is a treasure set, speaker is in lid. \$150 20. Radiola RS (I think) 1 tube (wdll brass base) Mint LT/\$130 WT/\$180 (tube is new) 21. AK 21Cc Similar to AK 30C but takes 199's Mint. (Like brand new. Not even a scratch or bit of dust.) LT\$165 WT/\$200 22. Crosley 51 2 tube set. Good to very Good. LT/\$75 23. Western Electric 7A amp. Exc. Lt/\$70 24. Clarion Flat Top Small AC Tombstone. Very Good. WT/\$40 25. Philco 50-1400 TV 1940's set. Mint with original book and schematics but not working. WT/\$50 26. Enjay Flat Top Bat. Op. set in Good to Very Good condition. WT/\$25 27. Philco 90 Cathedral Very good and working. \$200 28. German AC set. 1940's or early 50's. Exc. and working. \$25 29. Radiola 17 Early AC set. Very good to Exc. and working. Comes with RCA 100B speaker. Speaker is in fair condition (needs grille cloth on one side) WT/\$80 30. Floor cabinet with built in 110V speaker for #29 above in Mint condition. \$45 (or take #29 & 30 for \$105) 31. AK 40 with Peerless speaker (square) Fair WT/\$45 32. Silvertone tombstone Bat. Op. set. Good condition. WT/\$30 33. RCA R5 Cathedral. Cabinet Mint. Chassis untried (no cord). WT/\$75 34 Freshman Masterpiece 5 tube set. (This is slant front cabinet and is different from the model listed earlier in list.) Cabinet and chassis exc. Front panel needs paint job. LT/\$50 WT/\$75 35. All-American Monawk 5 tube set. Mint. LT/\$80 WT/\$105 36. Gloritone Cathedral Exc. and working WT/\$80 37. Thompson Horn Very Good to Exc. but not working. \$40 38. Trimm Horn Small horn in Mint condition. Works \$65 39. Magnavox M1 Horn Mint condition. (Just like new) \$80 40. Nathaniel Baldwin Horn Good to Very Good \$50 41. Bosch Cathedral Speaker. Mint+ \$60 42. Peerless Cathedral Speaker Mint \$55 43. AK Model E3 speaker

Exc. to Mint \$40 44. Harold Model B Horn Very Good \$40 45. Orchestron Delux Horn All wood and georgeous. Mint Extremely fancy. \$160 46. Brunswick Cathedral Speaker Good to Very Good \$30 47. 100B Speaker Fair \$12 48. Philco 39-6015 Flat Top Bat. Op. set. Good WT/\$20 49. Simpson Volt Meter 50. Western Electric Antique Volt and Ohm meter. Mint \$75 51. Homemade B-Battery Elim. Works \$15 52. Early Quack Medical Device Looks like crystal set. Has coil mounted in wooden box. Probably 1920's vintage. Has strange pamphlet describing gold finding device. \$35 53. Antique Tatooing Machine and all accessories. This is a real nice piece of equipment. Looks like 1920's vintage. \$150 54. Freed Eisemann NR5 Mint LT/\$175 WT/\$200 -- TUBES -- 01A's Used \$5 -- New with Brass Base \$12 199's \$10 -- Others. Write for quote. *Color photos of any set are available for \$1.00 and a stamped self addressed envelope. To stay on mailing list, send long S.A.S.E. as soon as possible. ---- Fireside Wireless, 1507 Ridge Avenue, New Castle, PA 16101 (412) 654-9335 *****
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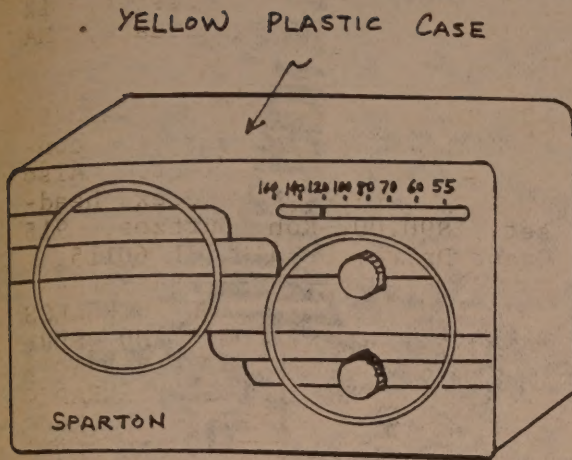
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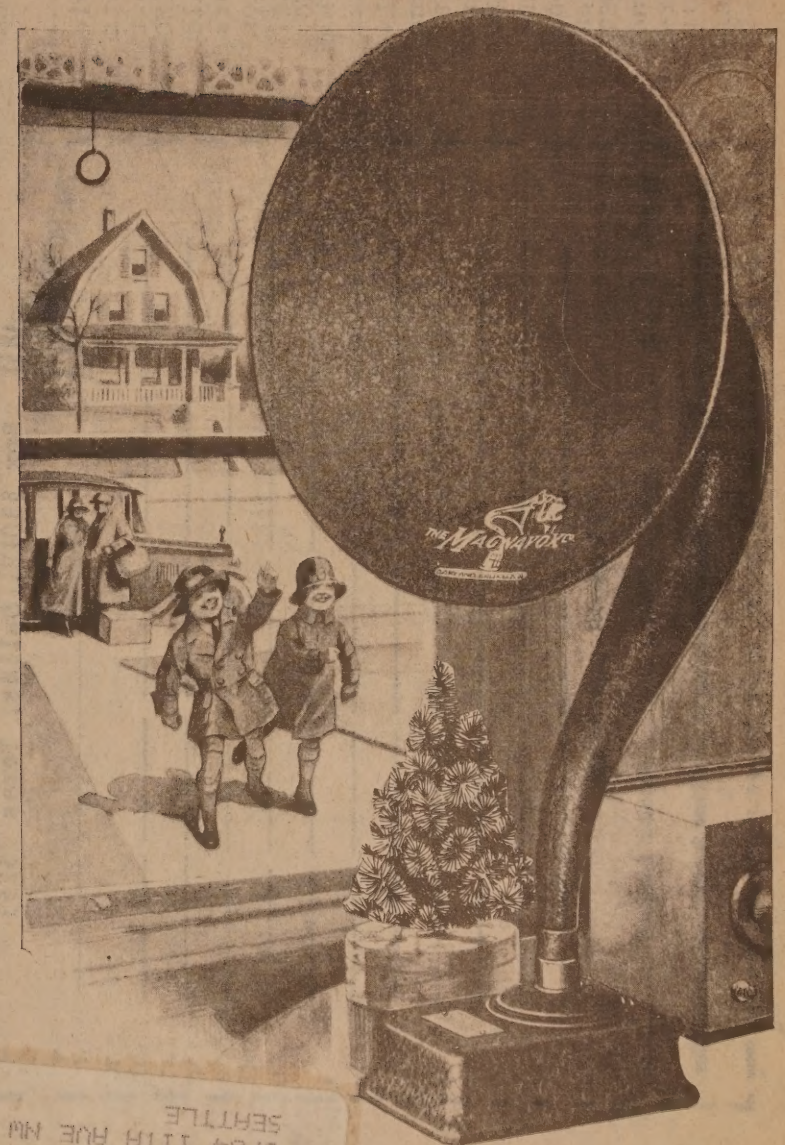
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